Labtronic® 8400 Controller
Component Test Control System
Affordable, Expandable Control for Component Testing

The Labtronic® 8400 controller is a state-of-the-art fully digital servohydraulic controller, designed specifically for component testing. It can accomplish simple tests with minimal investment, yet features the ability to be enhanced with additional capability to meet future needs. The integral front panel and display provide a simple, easy-to-use operator interface.

Future Upgrade Possibility

The Labtronic 8400 controller can grow with your testing needs. Multiple units can be quickly and easily linked together for multi-axis testing. In addition, for tests requiring sophisticated methods, advanced features such as bimodal amplitude control can be added at any time in the future. To take full advantage of the capabilities of this digital controller, a PC interface is also available. This allows either data acquisition only, or the use of all the existing IST software packages, such as WaveMaker™ or any package from the comprehensive RS LabSite® suite. The Labtronic 8400 controller uses the same hardware platform as the Labtronic 8800, which means that they can be directly linked together to expand the capabilities of an existing Labtronic 8800 controller.

Basic Controller

The Labtronic® 8400 controller is ideal for single axis durability testing of components. The unit is totally self-contained and no ancillary equipment such as a computer or external displays are required. When connected to any servohydraulic actuator, tests can be quickly and easily set-up, run, and monitored from the integral front panel. Being fully digital, the controller has advantages such as high accuracy, noise rejection, bumpless control mode transfer and control of hydraulics. The display has a similar user interface to the Labtronic 8800’s front panel, reducing the need for operator training.

Optional Firmware Features

Choose only the features required for current testing needs. The Labtronic 8400 controller is fully expandable to meet future testing needs. Optional firmware features such as bimodal amplitude control, auto-loop shaping and enhanced waveform generation can be added at any time in the future, enhancing the capabilities of the controller and allowing it to carry out progressively more complex tests. An on-screen oscilloscope is available for test monitoring. Also available through the use of the fully digital controller, is the ability to connect a computer to allow ‘User states’, which define every aspect of a test to be archived and recalled for future use.

Expandable for Investment Protection

The Labtronic 8400 controller is part of the Labtronic family of controllers, incorporating technology proven over thousands of control channels and ensuring reliable results. Unlike other digitally-supervised controllers, it offers all the advantages of full digital control, including for example, excellent repeatability and accuracy, as well as the ability to store all parameters associated with a test. Signal conditioning is fully digital and integrated into the controller allowing data acquisition without the use of external A-D cards. The unit is fully portable and can easily be moved around the laboratory, or rack-mounted in a standard 19” console.

Single axis component test rig
Expandable for Investment Protection

Multiple Axes

Single or multi-axis test capability. Labtronic® 8400 controller systems can grow to meet expanding test needs. The controllers can be quickly and easily linked together to allow multi-axis tests to be carried out, using the multi-unit interface panel. This includes links for the first on/last off pump controls, emergency stop chain connections and a sync link connector to synchronize waveforms. Channels can then be set-up as master or slave axes, as appropriate.

Data Acquisition Capability

The Labtronic 8400 has integral data acquisition capabilities. The controller is fully digital including all signal conditioning, which forms an integral part of the system. This means that acquiring data from any of the sensors simply requires the addition of the GPIB interface. Third party A-D conversion cards are not required. This provides greater flexibility, increased performance, and takes full advantage of the internal digital signal filters and the fact that all channels are synchronized.

Software Control

The complete RS LabSite® software suite is available for use with the Labtronic® 8400 controller. This expands its capability to suit the demands of progressively more complex test requirements. Block program using cyclic data, damper test software, elastomeric testing software and vibration control software are all available. In addition, the complete RS LabSite suite can be used, allowing for example road data to be reproduced and providing comprehensive databasing capabilities with data archiving schemes. This allows full integration of a Labtronic 8400 controller-based system into a laboratory equipped with multiple Labtronic 8800 controllers.

Link to Labtronic 8800 Controller

Use together with Labtronic 8800 controller for multi-axis tests. The Labtronic 8400 controller forms part of the Labtronic 8800 family. This means that not only is it possible to link Labtronic 8400 controllers together, but they can be quickly and easily linked to existing Labtronic 8800 controllers. This allows for a truly flexible use of controller resources within a laboratory. As the controller is fully compatible with the whole range of IST software, it can even be used to complement Labtronic 8800 controllers, for example, to run complex vehicle test rigs using RS LabSite simulation software. Furthermore, both products share the same hardware platform, which allows spare parts to be interchanged.

Learn more at: www.instron.com/ist

Configuration of a biaxial component test rig

Configuration of component test with data acquisition

Configuration of computer controlled test

Configuration of multi-axis test together with Labtronic 8800
Latest Digital Controller Technology

Standard Features

The Labtronic® 8400 is a stand-alone single axis controller, which belongs to the Labtronic family of controllers. Extensive control, measurement and test monitor features make it ideally suited for component testing. Its standard features will fulfill many basic test requirements and it can easily be upgraded for increased capability.

Operator Interface

A user-friendly operator interface saves on test set-up time. The Labtronic 8400 controller’s graphic display provides continuous operating status and test amplitude information. Changes in test set-up can be quickly made using an intuitive menu system with minimal scrolling.

- **Graphic Display** - The 120 mm x 80 mm (4.75 in x 3.5 in) display screen features comprehensive status display and logical menu tree for operator inputs
- **Controls** - An alphanumeric keyboard (imperious to dirt and oil) and special function keys, allow for high flexibility while maintaining user-friendly operation. A multi-function control knob provides analog feel for operator inputs
- **Oscilloscope** - Loop tuning assisted by on-board oscilloscope with auto scaling
- **Engineering Units** - Parameters displayed in engineering units, with user selection of SI, Metric or US Customary units
- **Help** - Pressing the Help button activates a context sensitive help message
- **User-Defined Labels** - Transducer signals can be custom labeled for operator convenience
- **Rack Mount** - As standard, unit is provided with removable brackets to enable the controller to be rack-mounted in a standard 19 in cabinet

Control

Full digital loop control allows features not usually associated with basic servo controllers. The built-in tuning oscilloscope allows the loop to be quickly-optimized without the use of an external oscilloscope.

- **Main Controller Board** - The integrated Axis Controller (IAC) board provides fully digital control. It incorporates two DSP processors, one for loop closure and the other for signal conditioning, allowing factors which degrade control performance such as noise and drift to be eliminated
- **Control Modes** - Two sensor conditioner modules (usually position and load) are provided for control feedback. With optional modes, up to four control modes are available. Digital control provides hysteresis control between feedback
- **Loop Tuning** - PIDD (Proportional, Integral, Differential and Feed Forward) gain is provided for optimizing the control-loop. In addition, a programmable Lag term is useful when a resonance is encountered
- **Function Generation** - Sine, triangle, square and ramp functions are available from the internal function generator. Alternately, external command signals can be used
- **Soft Start** - Programmable attack and decay times (controlled span rate of change) prevent unwanted start or stop transients
- **Hydraulic Control** - Panel buttons with status lights provide local hydraulic control and show operating status at a glance
- **Servo Valve Driver** - For two-stage servovalves
- **Delta P Stabilization** - Improves control with high mass loads (requires optional conditioner)

Measurement

Accurate measurement is the key to good test results. The Labtronic 8400 controller utilizes patented measurement technology and hardware developed to ensure the integrity of data. Integrated digital data acquisition provides superior performance and accuracy over older hybrid technology, including:

- **Two standard sensor conditioner modules** with provision for four in total. The unique transducer recognition feature saves calibration time by automatically setting excitation levels and allowing auto-calibration for IST transducers
- **Integrated data acquisition capability** with digital data transfer to PC (requires PC control option)
- **BNC Outputs** - Four programmable BNCs for external monitoring

Monitoring

Peak detectors provide visual confirmation of test results while passing and event detectors provide background monitor of test performance.

- **Peak Detectors** - Programmable to read minimum and maximum peaks, or amplitude and mean of the selected parameter. The ultimate peak values are also stored
- **Limit Detectors** - Each transducer signal has a minimum and maximum limit detector with programmable action
- **Cycle Counters** - Two counters with preset event actions count interim and total test cycles
- **Event Detectors** - Five event detectors are programmable to detect a variety of conditions including feedback underpeak, excess servo error and digital input trigger. The event action is also programmable
- **Digital I/Os** - Four inputs and four outputs provide logic communications with external devices

Data Integrity

The Labtronic 8400 controller’s design features and user interface were developed with the goal of maximizing test accuracy and eliminating operational errors, thus ensuring confidence in test results.

- **No Scrolling** User Interface - Provides immediate access to critical functions
- **Single Range Transducer Conditioning** - eliminates over-ranged data
- **Digital Data Interface** - Provides more reliable and accurate data collection than is possible with analog interfaces
- **Storage of Set-ups** - The Labtronic 8400 controller can store up to four set-ups (plus current set-up) for convenience and accuracy when repeating test set-ups
- **Auto Transducer Recognition** - Auto recognition of IST transducers saves calibration time and reduces errors by automatically establishing excitation and coarse gain
**Latest Digital Controller Technology**

**Optional Features**

Available optional features and hardware expand the capability of the Labtronic®® 8400 controller to match the Labtronic 8800 controller features. This assures that the user will not have to replace the controller in order to perform more sophisticated test functions.

**Firmware Options**

The Labtronic 8400 controller can be upgraded with firmware options at any time in the future, quickly and simply by inputting a feature access code on the front panel. Available options include:

- **Amplitude Control** - Bimodal amplitude control maintains test amplitude and mean level
- **Oscilloscope** - Two channel fully-featured oscilloscope with storage capability
- **GPIB Activated for PC Control** - Enables the Labtronic 8400 controller to be operated remotely via a PC. The full range of applications software available from IST provides a full range of control and data acquisition capabilities
- **Adaptive Control** - Continually updates loop tuning parameters in real time to compensate for specimen stiffness changes (consult IST or Instron®® for application advice)
- **Auto-Tune** - Automatically optimizes the control loop tuning parameters (pretest)
- **Extended Function Generator** - Adds trapezoid and haversine functions to standard waveforms

**Hardware Options**

The Labtronic®® 8400 controller has a wide range of hardware options which can be easily retrofitted in the test laboratory. Available options include:

- **Sensor Conditioners** - Conditioners three and four are available for monitoring only or with control-loop capability
- **Auxiliary Connector Panel** - Includes interface connectors for Delta P input, three-stage servo valves and jog handset
- **Delta P Conditioner** - Provides conditioning for Delta P transducer
- **Three-Stage Servo Valve Driver** - Provides closed-loop control for three-stage servo valves
- **Jog Handset** - Pendant type handset has jog controls to facilitate specimen loading
- **Multi-Unit Interface Panel** - Includes connections for sync-link cable, first on/last off pump interface, and emergency stop chain connection
- **Sync-Link Cable** - Used to connect multiple Labtronic®® 8400 controllers for use on a single test. Synchronizes the function generators and start/stop actions
- **Retrofit Interface Panel** - Provides drop-in replacement for selected controllers, including the MTS®® 406
- **Carrying Handle** - Convenient carrying handle doubles as a support stand for desktop operation
- **PC with GPIB Interface** - Allows operation via a PC, compatible with a wide range of software, covering applications from simple data acquisition through to full vehicle simulation using IST’s RS LabSite®® suite of programs. Materials testing applications are also available with Instron®®’s FastTrack®® software suite

**Controlled Parameter**

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<thead>
<tr>
<th>Time</th>
<th>Demanded Peak</th>
<th>With Adaptive Control</th>
<th>Without Adaptive Control</th>
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**Diagram**

- Labtronic 8400 - combine as many as you like
Technical Specifications

<table>
<thead>
<tr>
<th>General</th>
<th>Description</th>
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<tbody>
<tr>
<td>Number of Control-Loops</td>
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<tr>
<td>Number of Signal Conditioners</td>
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</tr>
<tr>
<td>Number of Control Channels</td>
<td>1 to 4</td>
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<tr>
<td>Package Style</td>
<td>Desktop unit or rack mount</td>
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Integrated Axis Controller (IAC)

Program Storage

Self Test

Diagnostics

Closed-Loop Control

Type

Control-Loop Parameters

Auto-Loop Shaping (Optional)

Adaptive Loop Shaping (Optional)

Servo Valve Drive Limits

Servo Valve Null Adjustment

Servo Valve Dither

Control Mode Transfer Accuracy

Control Mode Transfer Time

Compensation Input

External Inputs and Outputs

Digital Logic Inputs

Digital Logic Outputs

Analog Outputs

Analog Inputs

Signal Conditioning

Transducer Recognition/Compatible Transducer Types/Calibration

Excitation Frequency

Excitation Voltage

Input Sensitivity (Ratioometric Devices)

Input Sensitivity (DC Output Devices)

Balance Range

Over Range

Data Rate

Resolution

Accuracy

Demand Generation

Set Point

Waveforms (Basic)

Waveforms (Optional)

Internal Waveform

Amplitude Resolution

Waveform Maximum Frequency

Waveform Frequency Accuracy

Sample Data Playback

Sample Data Playback Rates

Sample Data Buffer Size

Demand Generation

Sample Data Filters

Data Loggin (Optional)

Limit detectors

Event detectors

Peak detectors

Computer Interface (Optional)

Hydraulic Controls

Solaris Drive

Solaris Drive Current Rating

Emergency Stop

Computer Control (Optional)

Supply and Environmental

Supply Voltage

Supply Frequency

Power Consumption

Operating Temperature

Storage Temperature Range

Operating Humidity Range

Storage Humidity Range

Dimensions

Desktop Unit or Rack Mounted Unit